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HOW TO MEASURE EGG I. Q.
(Interior Quality)

by

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INTRODUCTION

The laying hen does her duty when she lays an egg. Most people think that any fresh egg is a good egg but critical examination shows that a few new-laid eggs are not top quality. Such eggs are sorted out before they reach the consumer by candling. To do this eggs are examined by holding or twirling them before a strong light. Commercial egg grades are based on candling.

In some ways candling eggs is like culling hens for egg production. You can do a pretty good job of separating the high producing layers from the poor ones by culling. But, if you want to know exactly how many eggs a bird will lay you must use a trapnest. When dealing with eggs, candling will "cull" or separate eggs into rather wide classes of quality. More accurate and detailed information on egg quality is obtained by breaking out the egg on a flat surface and studying and measuring the contents.

Many different methods of scoring egg quality have been developed. Some of these methods are time consuming and require expensive equipment. The methods described in this leaflet are those that appear to be the simplest, fastest and most accurate.



There are two general ways of determining the quality of a broken-out egg. One is to judge the quality by comparison with a set of graded pictures. The egg is given the score of the picture it most nearly matches. This can be called the "eye-scoring" method.

Another method is to measure the height of the white and convert this to a number using a formula devised by a research worker named Haugh. The resulting figure is the quality value in Haugh units.

Wholesale egg handlers have been reporting the last few years that the percentage of top quality eggs is decreasing. This downward quality trend is continuing in spite of improvement in handling facilities, such as refrigeration and packaging.

In order to get more information on the subject, a survey of three egg laying tests was made. The I. Q. of a large number of hens from various breeds and strains was determined. The workers found that there was a wide difference in the I. Q. of new laid eggs. This range showed up when the eggs had been graded by the candling process but they were able to get more accurate data by breaking the eggs and measuring their I. Q. score.

It was concluded from these tests that the variation was not a question of feed, climate, breed or handling. Certain individual hens persistently laid eggs with a low I. Q. Other hens consistently laid eggs with a high I. Q.

Previous breeding experiments have demonstrated that this difference between birds is controlled to a large extent by inheritance. Therefore, a simple means of identifying and eliminating the low quality producers will make it possible to improve the quality of newly-laid eggs.

HOW TO TEST FOR I. Q.

There are three main factors that determine the quality of a fresh egg. They are:

1. Albumen Quality
2. Freedom from Defects
3. Shell Quality

1. Albumen Quality

It was mentioned earlier that research workers have developed two methods for determining albumen quality.

The "Eye scoring" method

To give an egg a quality score, first break it out on a flat surface such as a piece of window glass. Compare this egg with a set of pictures and select the number or "score" of the egg it most nearly matches. Be sure to take both the top and side view of each egg you break out.

There are two different sets of pictures or "charts" that can be used for scoring. One is the U.S.D.A. chart in natural colors. It pictures twelve eggs using three for each of the four qualities AA, A, B, and C. This chart shows eggs of high, medium and low quality as they are usually found in market channels. The yolks stand up high in the better eggs and are very flat and weak in the low quality eggs. Low quality fresh eggs do not have flat yolks. The U.S.D.A. chart is available free and it shows the eggs in full size and natural color. Scoring is the easiest when the pictures are in color and show eggs the same size as the one you break out.

The Van Wagenen chart, sometimes called the Cornell chart, has been widely used for "eye scoring" egg quality. The chart has nine

pictures of eggs that are high, medium and low quality. The eggs are all newly laid--actually less than four hours old. All the yolks stand up high even when the albumen quality is poor. The Van Wagenen chart is in black and white and the pictures are slightly less than 1/2 the size of an ordinary egg.

When selecting a chart to use for "eye scoring" here are the points to remember:

The U.S.D.A. chart:

1. Shows the U. S. qualities AA, A, B, and C.
2. Has twelve pictures.
3. Pictures the eggs in actual size and natural color.
4. Shows flat yolks in low quality eggs, which are not found in low quality fresh eggs.
5. Is available free.*

The Van Wagenen chart:

1. Is not divided according to the U. S. standards of quality.
2. Pictures nine eggs.
3. Shows eggs approximately half-size, black and white printing.
4. Shows high, medium and low quality fresh eggs similar to those a breeder would find when breaking eggs the day they are laid.
5. Is available only through purchase.**

The "Haugh Unit" method

The Haugh unit method is very accurate. It provides a quality measurement that has a high degree of accuracy and precision. The steps in

* Send your request to Marketing Services Division, Poultry Branch, P.M.A., U. S. Department of Agriculture, Washington 25, D. C.

** Available from The Service Press Inc., Hartford, Connecticut.

determining Haugh units are as follows:-

- (1) Weigh the egg
- (2) Break it out on a flat surface such as a piece of window glass.
- (3) Measure the height of the thick white using a micrometer or height gage*

Select an area where the thick white is flat on top. A good place to measure is half-way between the yolk and the edge of ^{the} thick white. Do not measure on top of the chalaza or on top of any bubbles.

Only one measurement is taken. After reading the albumen height on the micrometer determine the Haugh units on a calculator.** Instructions on using the calculator are included with each instrument.

A high Haugh unit value means high quality. Eggs above 79 Haugh units are "AA" quality in the U. S. standards. "A" quality ranges from 55 to 78; "B" quality 31 to 54 and values lower than 31 are "C" quality.

2. Freedom from defects

The most common defects found in eggs are blood and meat spots. These are readily seen when the broken out egg is examined. The size and number of such spots should be recorded. The U. S. standards for quality of individual shell eggs say that anything over 1/8 inch in diameter is a large spot and anything less is a small spot. Yolks are sometimes classified as normal, spotted or curdled.

3. Shell quality

The hen is expected to build a shell strong enough to carry the egg contents to the consumer without cracking under normal handling conditions. There is no simple way of measuring the strength of the unbroken shell.

* Available from Mr. Robert Rector, 700 Montgomery Ave., Laurel, Md.

** Available from Marketing Services Division, Poultry Branch, P.M.A., U. S. Department of Agriculture, Washington, D. C.

Since shells will be available from the broken-out eggs one easy method of estimating strength is to measure the thickness of the shell. There is a thickness gage* that does the job satisfactorily. First, remove a piece of the shell from the egg and place it between the jaws of the gage and read the figures on the scale. This measurement requires only a few seconds. Use samples of shell from different parts of the egg to locate the thinnest section. Many times this will be either the large or small end. If the measurements from the ends or center section of the shell are the same you will find it easier to use only the center portion. It is usually easier to leave the shell membranes on the piece of shell when measuring. In testing the shell from a certain hen be sure to get the piece of shell from about the same area each time. Shells thinner than 13 thousandths of an inch (.34mm) are poor risks in market channels.

Shell defects such as wrinkles, ridges, rough areas and body checks should be recorded along with shell thickness.

DEVELOPING AN I. Q. PROGRAM

Number of eggs to measure--For albumen quality it has been found that testing eggs from a hen until two eggs are found to agree in score or Haugh units gives a good estimate of the performance of that bird. Any two eggs measuring within 8 Haugh units are considered to be in good agreement. Individual birds are usually very consistent from egg to egg and it will be found that the first two eggs from a hen will agree 85 to 90 percent of the time. On the other birds it may be

* Paper thickness gage manufactured by B. C. Ames Company, Waltham, Mass. Any one of four models will serve. Model Nos. 25, 251, 252, or 25M.

necessary to break a third or fourth egg to find two that agree. The average will be about 2 1/4 eggs per bird in the flock.

For blood and meat spots and shell thickness more than two eggs would probably give a better index of the bird's performance. However, the two or three eggs used for albumen quality will serve as a guide and should point out the worst offenders. It takes time and costs money to break out eggs, therefore, if two or three eggs from a hen will give enough information about her I. Q. performance to evaluate her worthiness as a breeder then more eggs need not be sacrificed.

Season for measurements--In spring-hatched birds, albumen and shell quality are the lowest in July and August. The most critical test can be made during those months. Birds should be in production at least four months before quality determinations are made. Nearly all pullets when first in production lay eggs with high quality.

Time required--After some practice a fairly good operator can handle around 30 or 40 eggs an hour when measuring Haugh units and also measure the shells. If the operator is using the "score" method he may be able to do as many as 60 or 70 an hour. The operation is much more rapid when two operators are used, one to break eggs and score or measure and the other to record the data.

A very practical method is to save enough eggs each day to break out the next day in two or three hours. In that way quality measurements can be worked into a busy schedule.

Record work--Including these factors in a breeding program will entail additional record work and should not be overlooked in planning the program.

Cost of equipment--For Haugh units the micrometer will cost around \$50.00. The calculator will cost about \$2.00. For shell thickness the thickness gage will cost around \$20.00. For "scoring" the USDA chart is available free and the Van Wagenen chart will cost only a few cents. Other equipment such as a flat piece of glass and containers for the eggs you probably have on hand.

Egg holding conditions--It is essential that all eggs be held for the same length of time and at the same temperature before breaking out. The actual length of time between laying and testing is not important, but this period must always be constant. From a practical standpoint it is usually easier to control these factors by allowing the eggs to stand overnight in an egg room. The observations should be started at the same time each day. The danger is using 2 and 3 day old eggs comes from fluctuations in temperature.



